TechHub Journal Vol. 4, pp.1-12 (2023)
ISSN: 2810-2800
www.techhubresearch.com

Socio-emotional development of ASD children through theatrical training and the role of ICTs

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Abstract: In the present bibliographic study, the autism spectrum disorder and the contribution of theatrical training to the socio-emotional development of children with autism were studied. Through the present study it emerged that theatrical education and drama therapeutic interventions are an important pedagogical and therapeutic tool for the development of socio-emotional skills in children with autism. Finally, the importance of the alternative form of intervention based on theatre for special education and more specifically for children with autism, both inside and outside the school community, was recognized.

Keywords: Autism Spectrum Disorder, Special Education, Theatrical Training, Theatrical Play, Socio-Emotional Skills

1. Introduction

Socio-emotional skills are a determining factor in the development of the child's ability to communicate with other people, to know how to act in a particular social situation, to improve and maintain important social and emotional relationships, during his life. In typically developing children, the development of social skills follows a predictable developmental trajectory (Bellini, Peters, Benner, & Hopf, 2007). On the other hand, children with autistic spectrum disorder are characterized by significant difficulties in social interaction, communication, and limited areas of development and learning interest (Mpella, Evaggelinou, Koidou, & Tsigilis, 2019; APA, 2013; Kanner, 1943). Cognitive and social failure, including understanding moods and emotions, reduced social functioning and difficulty in initiating communication, building and developing positive and constructive social relationships with others, is among the most serious problems of children with autism (Ahlers, Gabrielsen, Lewis, Brady, & Litchford, 2017; Locke, Shih, Kretzmann, & Kasari, 2016; Dean et al., 2014; Chamberlain, Kasari, & Rotheram-Fuller, 2007; Boethious, Hallerfors, & Tischler, 2005) . In addition, persistent failure in the social interactions of autistic individuals leads to impaired visual communication and verbal integration (Pordanjani, 2021).

It is recognised that the teaching of such skills should best be undertaken using concrete materials and opportunities to make abstract concepts meaningful and tangible. Today, theatrical education is one of the recreational and pedagogical methods used to help develop socio-emotional skills of children with ASD in a number of different dimensions of everyday life (Fernandez-Aguayo, & Pino-Juste, 2018; Schonmann, 2011; Dalley, 2008; Scherrat, & Peter, 2000; Faure, & Lascar, 1990). Currently, several programs of theatrical play and interventions based on drama are used (Liu, 2020; Papavassiliou-Alexiou, & Zourna, 2016; McNaughton, 2010; Jennings, & Minde, 1993). Most of all these programs offer a variety of stimuli to autistic children, which are very important for their social life (Wu, Chen, Ma, & Vomocilova, 2020; Mastrominico et al., 2018; Cassidy, Turnbull, & Gumley, 2014; Johnson, 1991; Johnson, 1982) . Theatrical activities give children with ASD the opportunity to experience positive social interactions, introducing them to imaginary situations and stories, and to colorful characters that draw their curiosity and attention on various levels: emotional, cognitive, personal and social (Togia, Charitaki, & Soulis, 2017; Zimmer, 2007; Alevriadou et al., 2004; Somers, 2003). An important aspect of theatrical play is the experience, which is extremely important for these children to cope with their deficient social behaviors (Corbett et al., 2014). Also, through these human experiences they are exposed to undergo, they are offered the opportunity to examine ideas from

different perspectives, deepening their understanding of human behavior, properly educating their emotions and increasing their empathy (Mpella et al., 2019; O' Sullivan, & Wilde, 2015; Scherrat, & Peter, 2000).

2. Purpose of the survey

Based on this reality, in this thesis, the following two factors related to Theatrical Education in Special Education and in particular to the socio-emotional development of children with ASD were studied. The aim was, through the literature review, to highlight the deficits in the socio-emotional reciprocity that characterize children with ASD, but also to identify the most appropriate ways of intervention through theater-based practices.

3. Research questions

The exploratory questions that were studied were:

1. Can theatrical education contribute to the enhancement of social interactions and empathy of children with autistic spectrum disorder?

2. What specific theatre-based therapeutic interventions contribute to the socio-emotional development of children with autistic spectrum disorder?

4. Search sources

This paper was based on the method of bibliographic review of articles from reputable scientific journals with English as the main language. International experimental studies related to the subject were studied. In the first stage, articles were found and collected through an electronic search of the databases "Google Scholar", "ResearchGate" (ResearchGate | Find and share research), "Scopus" (Scopus - Document search) and "Academia" (Academia.edu - Share research). The key dates for identifying the studies were between 2011-2021. The key words of the articles were as follows: "Autism spectrum disorder and theatre", "Socio-emotional skills in autism", "Theatrical education", "Special education", "Theatrical play". Then, the articles selected after the application of the inclusion-exclusion criteria were grouped according to their content and presented.

5. Inclusion-exclusion criteria

In addition, the following inclusion and exclusion criteria were set:

1. The majority of the articles studied were experimental studies and not bibliographic reviews.

2. The search was limited to the correlation of the factors of theatrical education as an alternative way of intervention in special education and more specifically as a means of intervention for the socio-emotional development of children with autism spectrum disorder.

3. Finally, the exclusion criteria were the surveys that have been done before 2011, so that the sources of the present thesis are of the last decade.

6. Research Results

Theatrical play activities, which are interactive, seem to suit children with autistic spectrum disorder as an intervention, since emphasis is placed on communication, relationships, emotions, cooperation and imagination (Mitchell, Regehr, Reaume, & Feldman, 2010). In recent years, several studies have

been identified that have used theatrical education to address the social and emotional dysfunctions of children with ASD (Wu et al., 2020; Peter, 2009; Alevriadou et al., 2004).

The participation of children with ASD in drama sessions with improvisation techniques, images, narration, masks, puppets and role creation showed that they managed to practice transferable social skills and creative imagination skills (Kempe, & Tissot, 2012). Also, their participation in theatrical activities that include script learning, rehearsal process, costume design, stage construction and final performance preparation leads to a significant increase in language use, conversation and social response. It encourages participants to examine the feelings, motivations, and behaviors of others (Reading, Reading, Padgett, Reading, & Pryor, 2015).

The SDARI (Socio-Dramatic Affective-Relational Intervention) intervention is a social skills program that uses emotional improvisation games and dramatic games with winnings in social assertion and the ability to detect emotions in adult voices (Lerner, Mikami, & Levine, 2011). In addition, SCIPYC which is a social competence intervention program for young children, helps children with autism to develop behaviorally and emotionally, improve their social interactions and perform socially appropriate behaviors (Minne, & Clikeman, 2012). By participating in SENSE Theater they improve their verbal skills, are able to attribute mental states and behaviors to others, and present more collaborative play (Corbett et al., 2019).

Imaging Autism intervention provides a multisensory, thematic environment, facilitates communication (physical and verbal), improves social interaction with professionals and peers, imagination and creativity through improvisation (Beadle-Brown et al., 2018).

With the Hunter Heartbeat method, children show significant improvement in the areas of communication and socialization through their participation in games related to Shakespeare's play "The Storm" that include facial emotion recognition, eye contact, emotional imitation, emotional expression and social improvisation (Mehling, Tasse, & Root, 2017).

Also, dramatherapy interventions improve the involvement of children with ASD and the expression of their feelings and thoughts while at the same time presenting reduced hyperactivity / inattention and problematic behaviors (D' Amico, Lalonde & Snow, 2015; Pordanjani, 2021).

Storytelling as a therapeutic approach is a fairly satisfactory form of intervention since it leads to improvement of social skills, through the participation of children in directed communication, use of non-verbal communication, participation in play, development of imitation and improvement in their ability to recognize and remember facial stimuli (Giuliani, Couchepin Marchetti, & El Korh, 2016).

It is obvious that programs of educational drama and theatrical play with movement, pantomime, role play, improvisation and composition of works from stories, increase the self-esteem and empathy of children with ASD, show positive changes in their trust in others and participate in group and collaborative activities (Kim et al., 2015; Dogru, 2015; Naniwadekar, Ravi, & Sreevidya, 2016; Mpella et al., 2019).

It is noteworthy that several young people with ASD after participating in theatrical sessions and performances declared themselves happy and excited and felt proud (Loyd, 2015; Loyd, 2011).

7. Conclusion/Discussion

It is a fact that children with ASD face difficulty for mutual social interaction, for communication and for the expression of their feelings and thoughts. In addition, children with autism present difficulties in imagination and therefore in symbolic and creative play.

According to the review of the relevant research, it seems that the application of theatrical education through theatrical play and other theatrical experiences contributes to the improvement of children with ASD in the social and emotional fields. More specifically, significant changes in their social interactions

were observed and they developed behaviorally and emotionally. Participants experienced theatre as a joyful and exciting experience in a safe space, thus providing them with the motivation to participate in positive, interactive and social behaviors.

They also improved their ability to adapt, and consequently confidence-building was achieved and the risk of stress and repeatability were reduced. It is worth mentioning that in several cases, these results were maintained even after the intervention.

In summary, it seems that the overall results are quite encouraging for the contribution of theatrical education and theater-based therapeutic interventions to the development of the socio-emotional functioning of children with ASD. It will be extremely beneficial for special education actors and other therapeutic contexts to include theatrical interventions in their program in association with other interventions that are widely applied for autism spectrum disorder.

Finally, it is important for future research to focus on specific aspects of theatre that contribute to improving the socio-emotional functioning of children with ASD.

Concluding we underline the importance of the digital technologies in education domain and in socio-emotional training of ASD children that is very productive and successful, facilitates and improves the assessment, the intervention and the educational procedures via Mobiles which brings educational activities everywhere [51-56], various ICTs applications which are the core supporters of education [57-89], AI, STEM & ROBOTICS which raise educational procedures into new levers of performance [90-106], and games which transforms the education in a very friendly and enjoyable interaction [107-113]. Additionally the enhancement and combination of ICTs with theories and models of metacognition, mindfulness, meditation and emotional intelligence cultivation [114-154] as well as with environmental factors and nutrition [47-50], accelerates and improves more over the educational practices and results, especially in the socio-emotional training of ASD children via many methods including theatrical training and role modeling.

8. References

[1] Ahlers, K. P., Gabrielsen, T. P., Lewis, D., Brady, A. M., & Litchford, A. (2017). Supporting individuals with autism spectrum disorder in understanding and coping with complex social emotional issues. School Psychology International, 38(6), 586-607.

[2] Alevriadou, A., Anastasiou, D., Antonopoulou, K., Asteri, T., Mpelitsou, N., Papadopoulos, A., Pappas, I., Stampoltzi, A., & Staurousi, P. (2004). Department of special education: curricula for children with light and medium mental retardation. Athens: Pedagogical Institute.

[3] American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. Arlington: American Psychiatric Publishing, 2013

[4] Beadle-Brown, J., Wilkinson, D., Richardson, L., Shaughnessy, N., Trimingham, M., Leigh, J., & Himmerich, J. (2018). Imagining Autism: Feasibility of a drama-based intervention on the social, communicative and imaginative behaviour of children with autism. Autism, 22(8), 915-927.

[5] Bellini, S., Peters, J. K., Benner, L., & Hopf, A. (2007). A meta-analysis of school-based social skills interventions for children with autism spectrum disorders. Remedial and Special Education, 28(3), 153-162.

[6] Boethious, S.B., Hallerfors, B., Horne, A. & Tischler, L. (G. Tsiantis, Ed.). (2005). Working with parents. Psychoanalytic psychotherapy with children and adolescents. Athens: Kastaniotis.

[7] Cassidy, S., Turnbull, S., & Gumley, A. (2014). Exploring core processes facilitating therapeutic change in Dramatherapy: A grounded theory analysis of published case studies. The Arts in Psychotherapy, 41(4), 353-365.

[8] Chamberlain, B., Kasari, C., & Rotheram-Fuller, E. (2007). Involvement or isolation? The social networks of children with autism in regular classrooms. Journal of autism and developmental disorders, 37(2), 230-242.

[9] Corbett, B. A., Ioannou, S., Key, A. P., Coke, C., Muscatello, R., Vandekar, S., & Muse, I. (2019). Treatment effects in social cognition and behavior following a theater-based intervention for youth with autism. Developmental neuropsychology, 44(7), 481-494.
[10] Corbett, B. A., Swain, D. M., Newsom, C., Wang, L., Song, Y., & Edgerton, D. (2014). Biobehavioral profiles of arousal and social motivation in autism spectrum disorders. Journal of child psychology and psychiatry, 55(8), 924-934.
[11] D'Amico, M., Lalonde, C., & Snow, S. (2015). Evaluating the efficacy of drama therapy in teaching social skills to children with Autism Spectrum Disorders. Drama Therapy Review, 1(1), 21-39.
[12] Dalley, T. (Ed.). (2008). Art as therapy: An introduction to the use of art as a therapeutic technique. Routledge.
[13] Dean, M., Kasari, C., Shih, W., Frankel, F., Whitney, R., Landa, R., & Harwood, R. (2014). The peer relationships of girls with ASD at school: comparison to boys and girls with and without ASD. Journal of Child Psychology and Psychiatry, 55(11), 1218-1225.
[14] Dogru, S. S. Y. (2015). The effect of creative drama on pre-teaching skills and social communication behaviors of children with autism. Studies on Ethno-Medicine, 9(2), 181-189.
[15] Faure, G., & Lascar, S. (1990). Theatrical play in kindergarten and primary school (Translation. A. Stroumbouli). Athens: Gutenberg.
[16] Fernández-Aguayo, S., & Pino-Juste, M. (2018). Drama therapy and theater as an intervention tool: Bibliometric analysis of programs based on drama therapy and theater. The Arts in Psychotherapy, 59, 83-93.
[17] Giuliani, F., Couchepin Marchetti, B., & El Korh, P. (2016). Is Storytelling Therapy Useful for Children with Autism Spectrum Disorders and Severe Mental Retardation?. Advanced Techniques in Biology & Medicine, 4(1).
[18] Jennings, S., & Minde, Å. (1993). Art therapy and dramatherapy: Masks of the soul. Readers Digest.
[19] Johnson, D. R. (1982). Developmental approaches in drama therapy. The arts in Psychotherapy, 9(3), 183-189.
[20] Johnson, D. R. (1991). The theory and technique of transformations in drama therapy. The arts in psychotherapy.
[21] Kanner, L. (1943). Autistic disturbances of affective contact. Nervous child, 2(3), 217-250.
[22] Kempe, A., & Tissot, C. (2012). The use of drama to teach social skills in a special school setting for students with autism. Support for Learning, 27(3), 97-102.
[23] Kim, A. J., Stembridge, S., Lawrence, C., Torres, V., Miodrag, N., Lee, J., & Boynes, D. (2015). Neurodiversity on the stage: The effects of inclusive theatre on youth with autism. International Journal of Education and Social Science, 2(9), 27-39.
[24] Lerner, M. D., Mikami, A. Y., & Levine, K. (2011). Socio-dramatic affective-relational intervention for adolescents with Asperger syndrome & high functioning autism: Pilot study. Autism, 15(1), 21-42.
[25] Liu, Q. (2020, February). The guidance on the application of creative drama in special education. In 6th International Conference on Education, Language, Art and Inter-cultural Communication (ICELAIC 2019) (pp. 250-254). Atlantis Press.
[26] Locke, J., Shih, W., Kretzmann, M., & Kasari, C. (2016). Examining playground engagement between elementary school children with and without autism spectrum disorder. Autism, 20(6), 653-662.
[27] Loyd, D. (2015). Gaining views from pupils with autism about their participation in drama classes. British Journal of Learning Disabilities, 43(1), 8-15.
[28] Loyd, D. A. (2011). Perspective taking in individuals with autism in the interactive context of drama education (Doctoral dissertation, Institute of Education, University of London).

[29] Mastrominico, A., Fuchs, T., Manders, E., Steffinger, L., Hirjak, D., Sieber, M., & Koch, S. C. (2018). Effects of dance movement therapy on adult patients with autism spectrum disorder: A randomized controlled trial. Behavioral Sciences, 8(7), 61.
[30] McNaughton, M. J. (2010). Educational drama in education for sustainable development: Ecopedagogy in action. Pedagogy, Culture & Society, 18(3), 289-308.
[31] Mehling, M. H., Tassé, M. J., & Root, R. (2017). Shakespeare and autism: an exploratory evaluation of the Hunter Heartbeat Method. Research and practice in intellectual and developmental disabilities, 4(2), 107-120.
[32] Minne, E. P., & Semrud-Clikeman, M. (2012). A social competence intervention for young children with high functioning autism and Asperger syndrome: a pilot study. Autism, 16(6), 586-602.
[33] Mitchell, K., Regehr, K., Reaume, J., & Feldman, M. (2010). Group social skills training for adolescents with Asperger syndrome or high functioning autism. Journal on Developmental Disabilities, 16(2), 52.
[34] Mpella, M., Evaggelinou, C., Koidou, E., & Tsigilis, N. (2019). The Effects of a Theatrical Play Programme on Social Skills Development for Young Children with Autism Spectrum Disorders. International Journal of Special Education, 33(4), 828-845.
[35] Naniwadekar, K., Ravi, A., & Sreevidya, M. (2016). Impact of drama as a therapy for teaching social-communication skills on children with ASD. Int J Educ Psychol Res, 5, 48-51.
[36] O'Sullivan, C., & Wilde, O. (2015). Drama and autism. Encyclopedia of Autism Spectrum Disorder, 1-13.
[37] Papavassiliou-Alexiou, I., & Zourna, C. (2016). Teachers' professional competences: what has Drama in Education to offer? An empirical study in Greece. Professional Development in education, 42(5), 767-786.
[38] Peter, M. (2009). Drama: narrative pedagogy and socially challenged children. British Journal of Special Education.
[39] Rahimi Pordanjani, S. (2021). Effectiveness of Drama Therapy on Social Skills of Autistic Children. Practice in Clinical Psychology, 9(1), 9-18.
[40] Reading, S., Reading, J., Padgett, R. J., Reading, S., & Pryor, P. (2015). The use of theatre to develop social and communication behaviors for students with autism. Journal of Speech Pathology & Therapy, 1(1).
[41] Schonmann, S. (2011). Key Concepts in Theatre/ Drama Education. Israel: University of Haifa.
[42] Sherrat, D. & Peter, M. (2000). Developing Play Drama in Children with Autistic Spectrum Disorders. LondonQ David Fulton Publishers.
[43] Somers, J. (2003). Betwix and between pedagogy and art in the initial education of teachers of drama. Στο, Heikkinen, Hannu, Special Interest Fields of Drama, Theatre and Education, The IDEA Dialogues. Jyvaskyla, FinlandQ Jyvaskyla University Press.
[44] Togia, G., Charitaki, G., & Soulis, S. (2017). Special Educators' Perceptions about Learning Fundamental Social Skills through Theatrical Play: The Case of Children with Special Educational Needs. Asian Journal of Applied Science and Technology (AJAST), 1(6), 95-100.
[45] Wu, J., Chen, K., Ma, Y., & Vomočilová, J. (2020). Early intervention for children with intellectual and developmental disability using drama therapy techniques. Children and Youth Services Review, 109, 104689.
[46] Zimmer, R. (2007). Psychomotor Manual. Theory and Practice of Psychomotor Intervention. (Edited by Kambas A.). Athens: Athlotypos Publications.
[47] Stavridou Th., Driga, A.M., Drigas, A.S., 2021. Blood Markers in Detection of Autism, International Journal of Recent Contributions from Engineering Science & IT (iJES) 9(2):79-86.
[48] Zavitsanou, A., & Drigas, A. (2021). Nutrition in mental and physical health. Technium Soc. Sci. J., 23, 67.
[49] Driga, A.M., Drigas, A.S. 2019 "Climate Change 101: How Everyday Activities Contribute to the Ever-Growing Issue", International Journal of Recent Contributions from Engineering, Science & IT, vol. 7(1), pp. 22-31. https://doi.org/10.3991/ijes.v7i1.10031

[50] Driga, A.M., and Drigas, A.S. 2019 "ADHD in the Early Years: Pre-Natal and Early Causes and Alternative Ways of Dealing." International Journal of Online and Biomedical Engineering (IJOE), vol. 15, no. 13, p. 95., doi:10.3991/ijoe.v15i13.11203
[51] Papoutsi C., Drigas, A. S., and C. Skianis, 2018 "Mobile Applications to Improve Emotional Intelligence in Autism – A Review," Int. J. Interact. Mob. Technol. (iJIM); Vol 12, No 6,
[52] Stathopoulou A., Loukeris D., Karabatzaki Z., Politi E., Salapata Y., and Drigas, A. S., 2020 "Evaluation of Mobile Apps Effectiveness in Children with Autism Social Training via Digital Social Stories," Int. J. Interact. Mob. Technol. (iJIM); Vol 14, No 03,
[53] Stathopoulou, et all 2018, Mobile assessment procedures for mental health and literacy skills in education. International Journal of Interactive Mobile Technologies, 12(3), 21-37,
[54] Drigas, A., Kokkalia, G. & Lytras, M. D. (2015). Mobile and Multimedia Learning in Preschool Education. J. Mobile Multimedia, 11(1-2), 119–133.
[55] Kokkalia G, AS Drigas, A Economou 2016 Mobile learning for preschool education. International Journal of Interactive Mobile Technologies 10 (4)
[56] Stathopoulou A, Karabatzaki Z, Tsiros D, Katsantoni S, Drigas A, 2019 Mobile apps the educational solution for autistic students in secondary education Journal of Interactive Mobile Technologies 13 (2), 89-101
[57] Drigas, A. S., & Ioannidou, R. E. (2011, September). ICTs in special education: A review. In World Summit on Knowledge Society (pp. 357-364). Springer, Berlin, Heidelberg.
[58] Drigas, A. S., J.Vrettaros, L.Stavrou, D.Kouremenos, 2004. E-learning Environment for Deaf people in the E-Commerce and New Technologies Sector, WSEAS Transactions on Information Science and Applications, Issue 5, Volume 1, November
[59] Drigas, A.S., Vrettaros, J. and Kouremenos, D. (2004) 'Teleeducation and e-learning services for teaching English as a second language to deaf people, whose first language is the sign language', WSEAS Transactions on Information Science and Applications, Vol. 1, No. 3, pp.834–842.
[60] Drigas, A., Koukianakis, L., Papagerasimou, Y., 2011, Towards an ICT-based psychology: Epsychology, Computers in Human Behavior, 27:1416–1423. https://doi.org/10.1016/j.chb.2010.07.045
[61] Charami, F., & Drigas, A. (2014). ICTs in English Learning and Teaching. International Journal of Engineering and Science. Vol. 2(4):4-10. DOI: 10.3991/ijes.v2i4.4016
[62] Drigas A.S., Kouremenos D (2005). An e-learning system for the deaf people. In: WSEAS transaction on advances in engineering education, vol 2, issue 1, pp 20–24
[63] Drigas A., Pappas M, and Lytras M., 2016. "Emerging technologies for ict based education for dyscalculia: Implications for computer engineering education," International Journal of Engineering Education, vol. 32, no. 4, pp. 1604–1610,
[64] Drigas, A. & Kokkalia, G. 2017. ICTs and Special Education in Kindergarten. International Journal of Emerging Technologies in Learning 9 (4), 35–42.
[65] Drigas, A. S., Stavridis, G., & Koukianakis, L. (2004). A Modular Environment for E-learning and E-psychology Applications. WSEAS Transactions on Computers, 3(6), 2062-2067..
[66] Drigas, A., Leliopoulos, P.: Business to consumer (B2C) e-commerce decade evolution. Int. J. Knowl. Soc. Res. (IJKSR) 4(4), 1–10 (2013)
[67] Pappas M, Drigas A, Papagerasimou Y, Dimitriou H, Katsanou N, Papakonstantinou S, et al. 2018; Female Entrepreneurship and Employability in the Digital Era: The Case of Greece. Journal of Open Innovation: Technology, Market, and Complexity. 4(2): 15.
[68] Papanastasiou G., Drigas, A. S., Skianis Ch., M. Lytras & E. Papanastasiou, 2018. "Patient-Centric ICTs based Healthcare for students with learning, physical and/or sensory disabilities," Telemat Inform, vol. 35, no. 4, pp. 654–664, 2018. https://doi. org/10.1016/j.tele.2017.09.002
[69] Drigas, A., & Kontopoulou, M. T. L. (2016). ICTs based Physics Learning. International Journal of Engineering Pedagogy (iJEP), 6(3), 53-59. https://doi.org/10.3991/ijep.v6i3. 53-59

[70] Papanastasiou, G., Drigas, A., Skianis, C., and Lytras, M. (2020). Brain computer interface based applications for training and rehabilitation of students with neurodevelopmental disorders. A literature review. Heliyon 6:e04250. doi: 10.1016/j.heliyon.2020.e04250
[71] Pappas, M., Demertzi, E., Papagerasimou, Y., Koukianakis, L., Kouremenos, D., Loukidis, I. and Drigas, A. 2018. E-Learning for deaf adults from a user-centered perspective. Education Sciences 8(4)206:
[72] Pappas, M., Eleftheria Demertzi, Yannis Papagerasimou, Lefteris Koukianakis, Nikitas Voukelatos, and Drigas, A. S., 2019. Cognitive Based E-Learning Design for Older Adults. Social Sciences 8, 1 (Jan. 2019), 6. https://doi.org/10.3390/socsci801000
[73] Drigas, A. S., Lefteris Koukianakis 2009: Government online: An e-government platform to improve public administration operations and services delivery to the citizen. WSKS (1), volume 5736 de Lecture Notes in Computer Science, 523–532. Springer,
[74] Theodorou, P.; Drigas, A. 2017, ICTs and Music in Generic Learning Disabilities. Int. J. Emerg. Technol. Learn. 12(4), 101–110
[75] Pappas, M.A., & Drigas, A.S. (2015). ICT based screening tools and etiology of dyscalculia. International Journal of Engineering Pedagogy, (5)3, 61-66.
[76] Drigas, A., & Kostas, I. (2014). On Line and other ICTs Applications for teaching math in Special Education. International Journal of Recent Contributions from Engineering, Science & IT (iJES), 2(4), pp-46. http://dx.doi.org/10.3991/ijes.v2i4.4204
[77] Alexopoulou, A, Batsou, A, Drigas, A. (2019). Resilience and academic underachievement in gifted students: causes, consequences and strategic methods of prevention and intervention. International Journal of Online and Biomedical Engineering (iJOE), vol. 15, no. 14, pp. 78.
[78] Drigas, A. & Ioannidou, R. E. (2013). Special education and ICT's. International Journal of Emerging Technologies in Learning 8(2), 41– 47.
[79] Drigas, A., & Papanastasiou, G. (2014). Interactive White Boards in Preschool and Primary Education. International Journal of Online and Biomedical Engineering (iJOE), 10(4), 46–51. https://doi.org/10.3991/ijoe.v10i4.3754
[80] Drigas, A. S. and Politi-Georgousi, S. (2019). Icts as a distinct detection approach for dyslexia screening: A contemporary view. International Journal of Online and Biomedical Engineering (iJOE), 15(13):46–60.
[81] Lizeta N. Bakola, Nikolaos D. Rizos, Drigas, A. S., 2019 "ICTs for Emotional and Social Skills Development for Children with ADHD and ASD Co-existence" International Int. J. Emerg. Technol. Learn., 14(5), 122-131.
[82] Kontostavlou, E.Z., & Drigas, A.S. (2019). The Use of Information and Communications Technology (ICT) in Gifted Students. International Journal of Recent Contributions from Engineering, Science and IT, 7(2), 60-67. doi:10.3991/ijes.v7i2.10815
[83] Drigas, A. S., and Vlachou J. A., 2016. "Information and communication technologies (ICTs) and autistic spectrum disorders (ASD)," Int. J. Recent Contrib. Eng. Sci. IT (iJES), vol. 4, no. 1, p. 4, https://doi.org/10.3991/ijes.v4i1.5352
[84] Drigas, A. S., Koukianakis, L, Papagerasimou, Y. (2006) "An elearning environment for nontraditional students with sight disabilities.", Frontiers in Education Conference, 36th Annual. IEEE, p. 23-27.
[85] Drigas A., and Koukianakis L. 2006 An open distance learning e-system to support SMEs e-enterprising. In proceeding of 5th WSEAS Internationalconference on Artificial intelligence, knowledge engineering, data bases (AIKED 2006). Spain
[86] Drigas A, Petrova A 2014 ICTs in speech and language therapy International Journal of Engineering Pedagogy (iJEP) 4 (1), 49-54
[87] Bravou V, Oikonomidou D, Drigas A, 2022 Applications of Virtual Reality for Autism Inclusion. A review Retos 45, 779-785

[88] Chaidi I, Drigas A, 2022 "Parents' views Questionnaire for the education of emotions in Autism Spectrum Disorder" in a Greek context and the role of ICTs Technium Social Sciences Journal 33, 73-91
[89] Bravou V, Drigas A, 2019 A contemporary view on online and web tools for students with sensory & learning disabilities iJOE 15(12) 97
[90] Drigas, A. S., Rodi-Eleni Ioannidou, 2013 A Review on Artificial Intelligence in Special Education, Information Systems, Elearning, and Knowledge Management Research Communications in Computer and Information Science Volume 278, pp 385-391, http://dx.doi.org/10.1007/978-3-642-35879-1_46
[91] Drigas, A., Vrettaros, J. (2004): An Intelligent Tool for Building e-Learning Contend-Material Using Natural Language in Digital Libraries. WSEAS Transactions on Information Science and Applications 5(1) 1197–1205
[92] Drigas, A.S., Vrettaros, J., Koukianakis, L.G. and Glentzes, J.G. (2005). A Virtual Lab and e-learning system for renewable energy sources. Int. Conf. on Educational Tech.
[93] Drigas AS, Argyri K, Vrettaros J (2009) Decade review (1999-2009): artificial intelligence techniques in student modeling. In: World Summit on Knowledge Society. Springer, pp 552–564
[94] Vrettaros, J., Tagoulis, A., Giannopoulou, N., & Drigas, A. (2009). An empirical study on the use of Web 2.0 by Greek adult instructors in educational procedures. World Summit on Knowledge System (WSKS), 49, 164-170. http://dx.doi.org/10.1007/978-3-642-04757-2_18
[95] Drigas, A., Dourou, A. (2013). A Review on ICTs, E-Learning and Artificial Intelligence for Dyslexic's Assistance. iJet, 8(4), 63-67.
[96] Anagnostopoulou, P., Alexandropoulou, V., Lorentzou, G., Lykothanasi, A., Ntaountaki, P., & Drigas, A. (2020). Artificial intelligence in autism assessment. International Journal of Emerging Technologies in Learning, 15(6), 95-107. https://doi.org/10.3991/ijet.v15i06.11231
[97] Pappas, M., & Drigas, A. (2016). Incorporation of artificial intelligence tutoring techniques in mathematics. International Journal of Engineering Pedagogy, 6(4), 12–16. https://doi.org/10.3991/ijep.v6i4.6063
[98] Lytra N, Drigas A 2021 STEAM education-metacognition–Specific Learning Disabilities Scientific Electronic Archives 14 (10)
[99] Mitsea E, Lytra N, A Akrivopoulou, A Drigas 2020 Metacognition, Mindfulness and Robots for Autism Inclusion. Int. J. Recent Contributions Eng. Sci. IT 8 (2), 4-20
[100] Stavridis S, D Papageorgiou, Z Doulgeri 2017 Dynamical system based robotic motion generation with obstacle avoidance, IEEE Robotics and Automation Letters 2 (2), 712-718
[101] Kastritsi T, D Papageorgiou, I Sarantopoulos, S Stavridis, Z Doulgeri, 2019 Guaranteed active constraints enforcement on point cloud-approximated regions for surgical applications 2019 International Conference on Robotics and Automation (ICRA), 8346-8352
[102] Stavridis S, Z Doulgeri 2018 Bimanual assembly of two parts with relative motion generation and task related optimization 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems …
[103] Stavridis S, P Falco, Z Doulgeri 2020 Pick-and-place in dynamic environments with a mobile dual-arm robot equipped with distributed distance sensors IEEE-RAS 20th International Conference on Humanoid Robots (Humanoids)
[104] Papageorgiou D, S Stavridis, C Papakonstantinou, Z Doulgeri 2021Task geometry aware assistance for kinesthetic teaching of redundant robots IEEE/RSJ International Conference on Intelligent Robots and Systems …
[105] Kastritsi T, I Sarantopoulos, S Stavridis, D Papageorgiou, Z Doulgeri Manipulation of a Whole Surgical Tool Within Safe Regions Utilizing Barrier Artificial Potentials Mediterranean Conference on Medical and Biological Engineering and Computing …
[106] Stavridis S, D Papageorgiou, L Droukas, Z Doulgeri 2022 Bimanual crop manipulation for human-inspired robotic harvesting arXiv preprint arXiv:2209.06074

[107] Chaidi I, Drigas A 2022 Digital games & special education Technium Social Sciences Journal 34, 214-236
[108] Drigas, A. S., and Pappas M.A. 2015 "On line and other Game-Based Learning for Mathematics." International Journal of Online Engineering (iJOE) (11)4, 62-67, https://doi.org/10.3991/ijoe.v11i4.4742
[109] Papanastasiou, G., Drigas, A., Skianis, C., & Lytras, M. D. (2017). Serious games in K-12 education: Benefits and impacts on students with attention, memory and developmental disabilities. Program, 51(4), 424-440. https://doi.org/10.1108/prog-02-2016-0020
[110] Drigas, A. S., & Kokkalia, G. K. (2014). ICTs in Kindergarten. International Journal of Emerging Technologies in Learning, 9(2). https://doi.org/10.3991/ijet.v9i2.3278
[111] Doulou A, Drigas A 2022 Electronic, VR & Augmented Reality Games for Intervention in ADHD Technium Social Sciences Journal, 28, 159.
[112] Kokkalia, G., Drigas, A., & Economou, A. (2016). The role of games in special preschool education. International Journal of Emerging Technologies in Learning (iJET), 11(12), 30-35.
[113] Kefalis C, Kontostavlou EZ, Drigas A, 2020 The Effects of Video Games in Memory and Attention. Int. J. Eng. Pedagog. 10 (1), 51-61
[114] Drigas, A., & Mitsea, E. (2020). The 8 Pillars of Metacognition. International Journal of Emerging Technologies in Learning (iJET), 15(21), 162-178. https://doi.org/10.3991/ijet. v15i21.14907
[115] Drigas, A. S., and M. Pappas, 2017. "The Consciousness-Intelligence-Knowledge Pyramid: An 8x8 Layer Model," International Journal of Recent Contributions from Engineering, Science & IT (iJES), vol. 5, no.3, pp 14-25, https://doi.org/10.3991/ijes.v5i3.7680
[116] Drigas A, Karyotaki M (2017) Attentional control and other executive functions. Int J Emerg Technol Learn iJET 12(03):219–233
[117] Drigas A, Karyotaki M 2014. Learning Tools and Application for Cognitive Improvement. International Journal of Engineering Pedagogy, 4(3): 71-77. From (Retrieved on 13 May 2016)
[118] Drigas, A., & Mitsea, E. (2021). 8 Pillars X 8 Layers Model of Metacognition: Educational Strategies, Exercises &Trainings. International Journal of Online & Biomedical Engineering, 17(8). https://doi.org/10.3991/ijoe.v17i08.23563
[119] Drigas A., Papoutsi C. (2020). The Need for Emotional Intelligence Training Education in Critical and Stressful Situations: The Case of COVID-19. Int. J. Recent Contrib. Eng. Sci. IT 8(3), 20–35. 10.3991/ijes.v8i3.17235
[120] Drigas, A., & Mitsea, E. (2020). The Triangle of Spiritual Intelligence, Metacognition and Consciousness. International Journal of Recent Contributions from Engineering, Science & IT (iJES), 8(1), 4-23. https://doi.org/10.3991/ijes.v8i1.12503
[121] Kokkalia, G., Drigas, A. Economou, A., & Roussos, P. (2019). School readiness from kindergarten to primary school. International Journal of Emerging Technologies in Learning, 14(11), 4-18.
[122] Drigas, A., & Mitsea, E. (2021). Metacognition, stress-relaxation balance & related hormones. International Journal of Recent Contributions from Engineering, Science & IT (iJES), 9(1), 4–16. https://doi.org/10.3991/ijes.v9i1.19623
[123] Pappas M, Drigas A. 2019; Computerized Training for Neuroplasticity and Cognitive Improvement. International Journal of Engineering Pedagogy.9(4):50-62
[124] Papoutsi, C. and Drigas, A. (2017) Empathy and Mobile Applications. International Journal of Interactive Mobile Technologies 11(3). 57. https://doi.org/10.3991/ijim.v11i3.6385
[125] Papoutsi, C. & Drigas, A. (2016). Games for Empathy for Social Impact. International Journal of Engineering Pedagogy 6(4), 36-40.
[126] Karyotaki, M., & Drigas, A. (2015). Online and other ICT Applications for Cognitive Training and Assessment. International Journal of Online and Biomedical Engineering. 11(2), 36-42.
[127] Papoutsi, C., Drigas, A., & Skianis, C. (2019). Emotional intelligence as an important asset for HR in organizations: Attitudes and working variables. International Journal of Advanced Corporate Learning, 12(2), 21–35. https://doi.org/10.3991/ijac.v12i2.9620

[128] Chaidi I. Drigas, A. S., 2020. "Autism, Expression, and Understanding of Emotions: Literature Review," Int. J. Online Biomed. Eng., vol. 16, no. 02, pp. 94–111, https://doi.org/ 10.3991/ijoe.v16i02.11991
[129] Drigas, A. S., & Karyotaki, M. (2019). A Layered Model of Human Consciousness. International Journal of Recent Contributions from Engineering, Science & IT (iJES), 7(3), 41- 50. https://doi.org/10.3991/ijes.v7i3.11117
[130] Drigas, A. S., Karyotaki, M., & Skianis, C. (2018). An Integrated Approach to Neuro-development, Neuroplasticity and Cognitive Improvement. International Journal of Recent Contributions from Engineering, Science & IT (iJES), 6(3), 4-18.
[131] Karyotaki M. and Drigas, A. S., 2016. "Latest trends in problem solving assessment," International Journal of Recent contributions from Engineering, Science & IT (iJES), vol. 4, no. 2, 4-10.
[132] Mitsea E., Drigas, A. S., and Mantas P., 2021. Soft Skills & Metacognition as Inclusion Amplifiers in the 21st Century," Int. J. Online Biomed. Eng. IJOE, vol. 17, no. 04, Art. no. 04, https://doi.org/10.3991/ijoe.v17i04.20567
[133] Angelopoulou, E. Drigas, A. (2021). Working Memory, Attention and their Relationship: A theoretical Overview. Research. Society and Development, 10(5), 1-8. https://doi.org/10.33448/rsd-v10i5.15288
[134] Tourimpampa, A., Drigas, A., Economou, A., & Roussos, P. (2018). Perception and text comprehension. It'sa matter of perception! International Journal of Emerging Technologies in Learning (iJET). 13(7)
[135] Drigas A, Mitsea E 2020 A metacognition based 8 pillars mindfulness model and training strategies. International Journal of Recent Contributions from Engineering, Science & IT 8(4), 4-17.
[136] Papoutsi C, Drigas A, C Skianis 2021 Virtual and augmented reality for developing emotional intelligence skills Int. J. Recent Contrib. Eng. Sci. IT (IJES) 9 (3), 35-53
[137] Kapsi S, Katsantoni S, Drigas A 2020 The Role of Sleep and Impact on Brain and Learning. Int. J. Recent Contributions Eng. Sci. IT 8 (3), 59-68
[138] Drigas A, Mitsea E, Skianis C 2021 The Role of Clinical Hypnosis and VR in Special Education International Journal of Recent Contributions from Engineering Science & IT 9(4), 4-17.
[139] V Galitskaya, A Drigas 2021 The importance of working memory in children with Dyscalculia and Ageometria Scientific Electronic Archives 14 (10)
[140] Chaidi I, Drigas A 2020 Parents' Involvement in the Education of their Children with Autism: Related Research and its Results International Journal Of Emerging Technologies In Learning (Ijet) 15 (14), 194-203.
[141] Drigas A, Mitsea E 2021 Neuro-Linguistic Programming & VR via the 8 Pillars of Metacognition X 8 Layers of Consciousness X 8 Intelligences Technium Soc. Sci. J. 26, 159
[142] Drigas A, Mitsea E 2022 Conscious Breathing: a Powerful Tool for Physical & Neuropsychological Regulation. The role of Mobile Apps Technium Social Sciences Journal 28, 135-158
[143] Drigas A, Mitsea E, C Skianis 2022 Clinical Hypnosis & VR, Subconscious Restructuring-Brain Rewiring & the Entanglement with the 8 Pillars of Metacognition X 8 Layers of Consciousness X 8 Intelligences. International Journal of Online & Biomedical Engineering 18 (1)
[144] Drigas A, Karyotaki M 2019 Attention and its Role: Theories and Models. International Journal of Emerging Technologies in Learning 14 (12), 169-182
[145] Drigas A, Karyotaki M 2019 Executive Functioning and Problem Solving: A Bidirectional Relation. International Journal of Engineering Pedagogy (iJEP) 9 (3)
[146] Bamicha V, Drigas A 2022 ToM & ASD: The interconnection of Theory of Mind with the social-emotional, cognitive development of children with Autism Spectrum Disorder. The use of ICTs as an alternative … Technium Social Sciences Journal 33, 42-72
[147] Drigas A, Mitsea E, C Skianis 2022 Neuro-Linguistic Programming, Positive Psychology & VR in Special Education. Scientific Electronic Archives 15 (1)

[148] Drigas A, Mitsea E, Skianis C. 2022 Virtual Reality and Metacognition Training Techniques for Learning Disabilities SUSTAINABILITY 14(16), 10170
[149] Drigas A,. Sideraki A. 2021 Emotional Intelligence in Autism Technium Soc. Sci. J. 26, 80
[150] Drigas A, Mitsea E, Skianis C.. 2022 Subliminal Training Techniques for Cognitive, Emotional and Behavioural Balance. The role of Emerging Technologies Technium Social Sciences Journal 33, 164-186
[151] Bakola L, Drigas A, 2020 Technological development process of emotional Intelligence as a therapeutic recovery implement in children with ADHD and ASD comorbidity. . International Journal of Online & Biomedical Engineering, 16(3), 75-85
[152] Bamicha V, Drigas A, 2022 The Evolutionary Course of Theory of Mind - Factors that facilitate or inhibit its operation & the role of ICTs Technium Social Sciences Journal 30, 138-158
[153] Karyotaki M, Bakola L, Drigas A, Skianis C, 2022 Women's Leadership via Digital Technology and Entrepreneurship in business and society Technium Social Sciences Journal. 28(1), 246–252.
[154] Mitsea E, Drigas A,, Skianis C, 2022 Breathing, Attention & Consciousness in Sync: The role of Breathing Training, Metacognition & Virtual Reality Technium Social Sciences Journal 29, 79-97